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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/509,250

09/28/2004

Shinji Shimosaki

12054-0029

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EXAMINER

DINH, BACH T

ART UNIT

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1795

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/509,250	<b>Applicant(s)</b> SHIMOSAKI, SHINJI	
	<b>Examiner</b> BACH T. DINH	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/07/2008 has been entered.

### ***Summary***

2. This is the response to the communication filed on 10/07/2008.
3. All previous rejections are withdrawn in view of applicant's amendment to the claims.
4. Claims 1-16 remain pending in the application.
5. The amendment did not place the application in condition for allowance.

### ***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 14 recites the limitation "said dissolving and bringing into contact steps" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim.
8. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 14 recites the limitation "said dissolving and bringing into contact steps";

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however, steps 7 and 8 do not recited said steps; therefore, it is unclear as to which dissolving and bringing into contact steps current claim requires.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-3, 7-10 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenberg et al. (US 6,309,595) with further evidence provided by Shiota et al. (WO 9847824) with equivalent English translation provided by Shiota et al. (US 2002/0070155).

Addressing claims 1-2, Rosenberg discloses a method of purifying a metal in which adsorbents comprising one or more of titanium, titanium alloy, zirconium and zirconium alloy are immersed into a metal salt formed by melting an alkali metal salt, an alkaline earth metal salt or a mixture thereof (2:1-15 and 3:34-51; the reaction of titanium tetrachloride with a reducing agent comprising alkali and/or alkaline earth metal produces

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titanium or claimed titanium adsorbents and molten salt or claimed metal salt; the prior art would produce the purifying step because it performs the same method steps as recited in the claimed invention; specifically, the titanium is brought into contact with melted alkali and/or alkaline earth metal salt; 4:25-28 and 4:50-55, the salt is melted).

Furthermore, Shiota provides evidence that titanium and titanium alloys are used as adsorbent in waste water treatment [0164]; therefore, the titanium formed in the process of Rosenberg is capable of purifying the molten metal salt by adsorbing impurities in the molten metal salt.

Rosenberg is silent regarding the relationship between the volume of the metal salt and the total surface area of the titanium metal salts immersed in the metal salt.

Rosenberg discloses reducing agent comprising alkali and/or alkaline earth metal react with titanium tetrachloride to produce titanium sponge (2:1-15, 24:28-30), which is highly porous and having high surface area. Therefore, as more the titanium sponge is produced in the container with a fixed volume of molten metal salt, the ratio of volume of metal salt to the surface area of the titanium sponge decreases. Subsequently, the titanium sponge is electrolyzed to make pure titanium crystals (2:5-8).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Rosenberg to maximize the amount of titanium sponge produced in order to maximize the production of pure titanium crystals. Therefore, one with ordinary skill in the art would have arrived at the claimed relationship between the volume of the molten metal salt and total surface area of the titanium adsorbents when

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performing routine experimentation to optimize the production of the titanium sponge in order to optimize the production of pure titanium crystals.

Addressing claims 3 and 10, the word “foil” is interpreted to include “a thin layer of metal”; therefore, when the titanium sponge is formed during the reduction process, the titanium material would deposit first as a thin layer of titanium metal or foil-like titanium.

Addressing claim 15, Rosenberg discloses the molten alkali metal is charged to the container before the reduction process (9:3-6) and  $\text{TiCl}_4$  is added to the molten metal via feed pipe (9:1-2); therefore, Rosenberg discloses the method of current claim for molten metal salt is formed when  $\text{TiCl}_4$  reacts with the molten metal and as additional  $\text{TiCl}_4$  is added to the container already with the molten metal salt, titanium is formed in the molten metal salt, which reads on the recited limitation “titanium is added to a bath of the molten metal salt”.

Addressing claims 7, 9 and 13-14, Rosenberg discloses conducting electrolysis to form pure titanium crystal in the same container (2:5-8) with the same molten metal salt produced in the reduction process (2:16-28). Due to the indefiniteness of claim 14 as addressed above, the disclosure of Rosenberg also reads on the limitation of claim 14.

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Addressing claim 8, Rosenberg discloses K and Li can be used a molten salts (3:61-65) and mixed metal salts can be used to lower the operating temperature (11:8-11 and 20:38-60, with LiCl + NaCl and KCl as example).

At the time of the invention, it would have been obvious for one with ordinary skill in the art to modify the method of Rosenberg with using the mixed metal salt of LiCl + KCl because doing so would also lower the operating temperature (11:8-11 and 20:38-60).

12. Claims 4-6, 11-12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenberg et al. (US 6,309,595) with further evidence provided by Shiota et al. (WO 9847824) with equivalent English translation provided by Shiota et al. (US 2002/0070155) as applied to claims 1-3, 7-10 and 13-15 above, and further in view of Fray et al. (US 2006/0086621).

Addressing claims 4-5 and 11, Rosenberg discloses that low oxygen Ti is desired in chip manufacturers (21:1-6), specifically the Ti material with less than 100 ppm of oxygen (1:44-50), and oxygen is introduced to the titanium material during the precursor materials of TiCl<sub>4</sub> and molten metal; oxygen is also introduced during sponge production process to form titanium oxides (21:10-18). Furthermore, Rosenberg discloses Ca is used as the molten metal (3:61-65), which would form molten CaCl<sub>2</sub> salt.

Rosenberg is silent regarding dissolving metallic calcium to the molten metal salt for deoxidizing a titanium material.

Fray discloses an electrochemical method; wherein, calcium 8 is added to the bath of CaCl<sub>2</sub> salt in order to improve the amount of oxygen that can removed from titanium

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oxide (figure 2, [0064-0069]). Furthermore, the added calcium is dissolved in the melt [0068].

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Rosenberg with the method of deoxidizing method of Fray because doing so would remove the oxygen in the titanium product (Fray, [0064-0069]); thereby producing the desired titanium product with oxygen concentration as required by Rosenberg (Rosenberg, 1:44-50 and 21:1-6).

Addressing claims 6 and 12, Rosenberg discloses after the purification step as addressed in the rejection of claim 1, the titanium sponge is formed in the container.

Fray discloses calcium source 8 is added to the container containing the titanium with dissolved oxygen (figure 2, [0065]).

At the time of the invention, one with ordinary skill in the art would have found it obvious to modify the method of Rosenberg by adding calcium source of Fray to the same container used for the purification step to remove oxygen because doing so would minimize the production steps by eliminating the step of transferring the titanium sponge from one container to another.

Addressing claim 16, Rosenberg discloses the molten alkali metal is charged to the container before the reduction process (9:3-6) and  $\text{TiCl}_4$  is added to the molten metal via feed pipe (9:1-2); therefore, Rosenberg discloses the method of current claim for molten metal salt is formed when  $\text{TiCl}_4$  reacts with the molten metal and as additional  $\text{TiCl}_4$  is



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added to the container already with the molten metal salt, titanium is formed in the molten metal salt, which reads on the recited limitation "titanium is added to a bath of the molten metal salt".

### ***Response to Arguments***

13. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BACH T. DINH whose telephone number is (571)270-5118. The examiner can normally be reached on Monday-Friday EST 7:00 A.M-3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571)272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BD

02/12/2009

/Kaj K Olsen/

Primary Examiner, Art Unit 1795